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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,502	11/26/2003	Benjamin Charles Nuttall	C-2725	8956

7590 04/03/2006

StephenA. Schneeberger
49 Arlington Road
West Hartford, CT 06107

EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/723,502	NUTTALL ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 February 2006 and 03/17/06*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This office communication is being provided in reply to the amendments dated 02/23/06 and 03/17/06. The applicant has overcome the objections, the 35 USC 112 rejection and the 35 USC 102 rejection. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims are finally rejected over newly discovered art as seen hereunder and for the reasons of record:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 11 are (*at least*) rejected under 35 U.S.C. 102(e) as being **clearly** anticipated by Grasso et al 6979505.

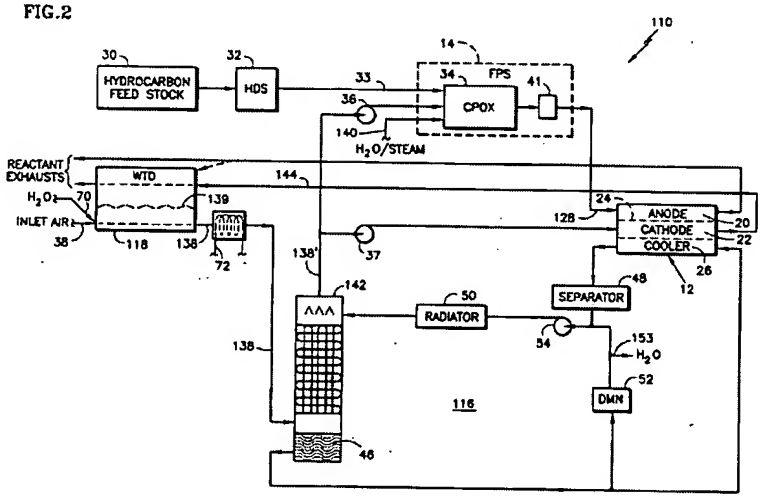
The applied reference has a common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The present application is directed to a fuel cell power plant wherein the claimed inventive concept comprises the energy recovery device in combination with the specific injection means.

Figure 2 of Grasso et al'505 illustrates a fuel cell power system 110 including fuel cell 12 having an oxidant feeding line 138' and a fuel feeding line 128 (ABSTRACT/ Col 6, lines 42-55). Reference numeral 118 is a WTD device including the mass transfer medium 138 having first fuel cell exhaust channel and second oxidant inlet channel (through lines 144 and 138, respectively) (COL 7, lines 45-67/FIGURE 2). Stream 144 is in mass transfer communication with oxidant stream 138.

As illustrated in **Figure 2**, a water injecting device 70 for injecting water is located at or near the inlet end of the WTD 118 for the inlet oxidant 38 and is disposed to inject a spray of water thereinto (COL 8, lines 16-25).

FIG.2



Thus, at least claims 1 and 11 are anticipated.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grasso et al 6274259 in view of Grasso et al 6979505.

The present application is directed to a fuel cell power plant wherein the claimed inventive concept comprises the energy recovery device in combination with the specific injection means.

As to claims 1 and 11:

Grasso et al'259 disclose a fuel cell power plant that generates electrical energy from a process oxidant stream and a reducing fluid stream comprising at least one fuel cell means for producing the electrical energy (CLAIM 1). Disclosed is the latent and sensible heat of the exhaust stream (COL 11, lines 50-55). Grasso et al also disclose a direct mass and heat transfer

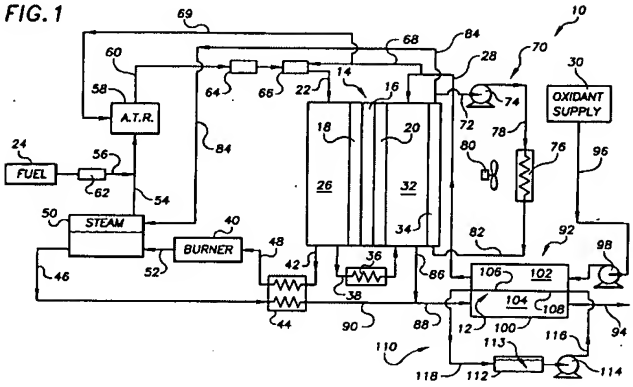
devices (*the energy recovery device*) secured in fluid communication with both a primary oxidant inlet line that directs the process oxidant stream into the fuel cell means and also with a plant exhaust passage that directs a plant exhaust stream out of the fuel cell means (CLAIM 1 /COL 7, line 55 to COL 8, line 50). The device includes a fine pore enthalpy exchange barrier in mass transfer relationship between the oxidant and exhaust streams passing through the device so that the process oxidant stream passes adjacent an inlet surface of the barrier and the plant exhaust stream passes adjacent an opposed exhaust surface of the barrier (CLAIM 1/ COL 7, line 55 to COL 8, line 50). Grasso et al inherently encompass the operation (*the method*) of the fuel cell plant using the energy recovery device (COL 11; lines 48-67/CLAIM 25).

Grasso et al further disclose that the mass and heat transfer device means may include a liquid transfer medium supply means for supplying a liquid transfer medium thereto (COL 8, lines 33-50). Disclosed is that transfer feed line 116 is in fluid communication between the reservoir 112 and the barrier 12 (COL 8, lines 33-50). Water may be the liquid transfer medium (COL 9, lines 52-60). *Thus, the examiner sets forth that Grasso et al's liquid transfer medium supply means serves as the claimed injection means disposed to inject a liquid medium thereinto.*

Examiner's note: *the claim language "injection means disposed to inject a liquid" now has been construed as invoking the 35 USC 112, 6th paragraph*

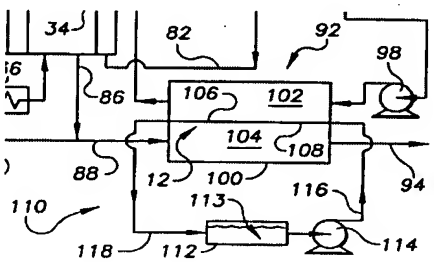
Figure 1 below illustrate the fuel cell power system including the fuel cell unit and the energy recovery device and the injection means:

FIG. 1



Concerning claims 2-3:

As evident from enlarged portion of **Figure 1** below, the energy recovery device include the oxidant chamber 102 for receiving oxidant through inlet line between chamber 92 and blower 98; the transfer medium feed line 116 for introducing a liquid medium into chamber 102 and positioned immediately upstream of the inlet line (SEE Figure 1). Water may be the liquid transfer medium (COL 9, lines 52-60). *It is also contended that the inlet regions of both the oxidant the liquid transfer medium encompasses the plenum.*



With respect to claim 9-10:

Grasso et al disclose the use of a fine pore enthalpy exchange barrier including a support matrix means (COL 8, lines 52-55) wherein such support structure matrix means include porous graphite layers; porous graphite polymers layers; inorganic-fiber thermoset polymer layers, glass fiber layers and synthetic-fiber filter papers treated to be wettable, porous metal layers, perforated metal layers and the like (COL 9, lines 30-40).

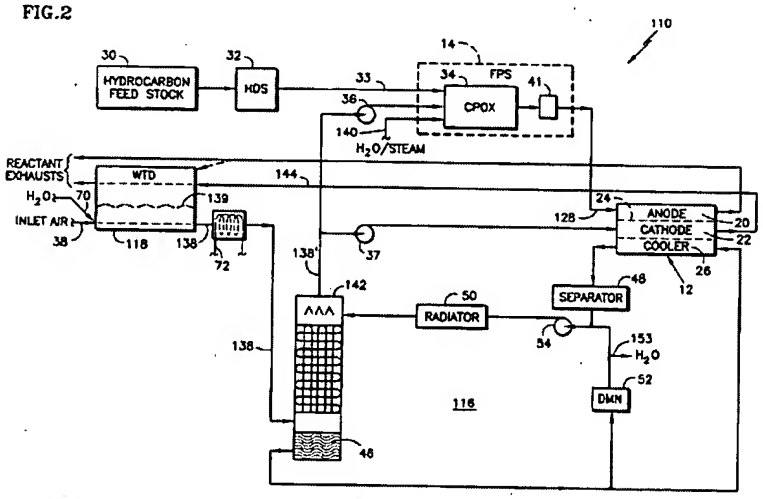
Grasso et al'259 discloses a fuel cell power systems as seen and described. Nevertheless, Grasso et al fail to expressly disclose the specific liquid supply and injecting means.

As to claim 1:

Figure 2 of Grasso et al'505 illustrates a fuel cell power system 110 including fuel cell 12 having an oxidant feeding line 138' and a fuel feeding line 128 (ABSTRACT/ Col 6, lines 42-55). Reference numeral 118 is a WTD device including the mass transfer medium 138 having first fuel cell exhaust channel and second oxidant inlet channel (through lines 144 and 138, respectively) (COL 7, lines 45-67/FIGURE 2). Stream 144 is in mass transfer communication with oxidant stream 138.

As illustrated in **Figure 2**, a water injecting device as spray nozzle 70 for injecting water is located at or near the inlet end of the WTD 118 for the inlet oxidant 38 and is disposed to inject a spray of water thereinto (COL 8, lines 16-25).

FIG.2



As to claims 4-5:

Grasso et al'505 uses a water injecting device such as spray nozzle 70 for injecting water is located at or near the inlet end of the WTD 118 for the inlet oxidant 38 and is disposed to inject a spray of water thereinto (COL 8, lines 16-25).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the specific liquid supply and injecting means of Grasso et al'505 in the fuel cell power system of Grasso et al'259 because Grasso et al'505 teach that the specific liquid supply and injecting means additionally enhance the cleansing capability of the mass transfer device; specifically, the excess of injected water helps to dissolve SO2 and sulfate aerosols. Thus, it provides a suitable arrangement for further enhancing the cleansing of sulfur from the inlet oxidant stream.

6. Claims 1-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grasso et al 6274259 in view of Herd et al 2003/0116654.

The present application is directed to a fuel cell power plant wherein the claimed inventive concept comprises the energy recovery device in combination with the specific injection means.

As to claims 1 and 11:

Grasso et al'259 disclose a fuel cell power plant that generates electrical energy from a process oxidant stream and a reducing fluid stream comprising at least one fuel cell means for producing the electrical energy (CLAIM 1). Disclosed is the latent and sensible heat of the exhaust stream (COL 11, lines 50-55). Grasso et al also disclose a direct mass and heat transfer devices (*the energy recovery device*) secured in fluid communication with both a primary

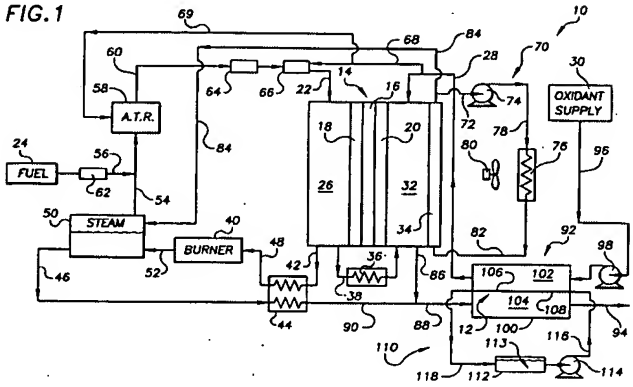
oxidant inlet line that directs the process oxidant stream into the fuel cell means and also with a plant exhaust passage that directs a plant exhaust stream out of the fuel cell means (CLAIM 1 /COL 7, line 55 to COL 8, line 50). The device includes a fine pore enthalpy exchange barrier in mass transfer relationship between the oxidant and exhaust streams passing through the device so that the process oxidant stream passes adjacent an inlet surface of the barrier and the plant exhaust stream passes adjacent an opposed exhaust surface of the barrier (CLAIM 1/ COL 7, line 55 to COL 8, line 50). Grasso et al inherently encompass the operation (*the method*) of the fuel cell plant using the energy recovery device (COL 11, lines 48-67/CLAIM 25).

Grasso et al further disclose that the mass and heat transfer device means may include a liquid transfer medium supply means for supplying a liquid transfer medium thereto (COL 8, lines 33-50). Disclosed is that transfer feed line 116 is in fluid communication between the reservoir 112 and the barrier 12 (COL 8, lines 33-50). Water may be the liquid transfer medium (COL 9, lines 52-60). *Thus, the examiner sets forth that Grasso et al's liquid transfer medium supply means serves as the claimed injection means disposed to inject a liquid medium thereinto.*

Examiner's note: *the claim language "injection means disposed to inject a liquid" now has been construed as invoking the 35 USC 112, 6th paragraph*

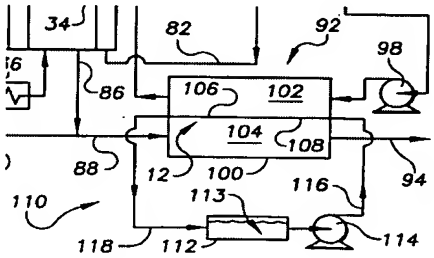
Figure 1 below illustrate the fuel cell power system including the fuel cell unit and the energy recovery device and the injection means:

FIG. 1



Concerning claims 2-3:

As evident from enlarged portion of **Figure 1** below, the energy recovery device include the oxidant chamber 102 for receiving oxidant through inlet line between chamber 92 and blower 98; the transfer medium feed line 116 for introducing a liquid medium into chamber 102 and positioned immediately upstream of the inlet line (SEE Figure 1). Water may be the liquid transfer medium (COL 9, lines 52-60). *It is also contended that the inlet regions of both the oxidant the liquid transfer medium encompasses the plenum.*



With respect to claim 9-10:

Grasso et al disclose the use of a fine pore enthalpy exchange barrier including a support matrix means (COL 8, lines 52-55) wherein such support structure matrix means include porous graphite layers; porous graphite polymers layers; inorganic-fiber thermoset polymer layers, glass fiber layers and synthetic-fiber filter papers treated to be wettable, porous metal layers, perforated metal layers and the like (COL 9, lines 30-40).

Grasso et al'259 discloses a fuel cell power systems as seen and described. Nevertheless, Grasso et al'259 fail to expressly disclose the specific liquid supply and injecting means.

As to claims 1 and 4-5:

Herd et al disclose a water supply system for a fuel cell (TITLE) comprising an apparatus for supplying water to a plurality of individually controllable water injectors. Each water injector has associated therewith a respective controllable solenoid valve to control the amount of water supplied to the water injector, in dependence upon a control signal (ABSTRACT/ P. 0004-006).

Herd et al disclose that in order to improve the efficiency of the electrochemical reaction, the gas flows are both pressurized and humidified (P. 0002). An additional reason for humidifying the gases is to ensure that the membrane does not dry out since this not only leads to a reduction in the efficiency of the migration hydrogen ions across the membrane, but can damage and reduce the service life of the membrane (P. 0002).

(***Emphasis added→***) Herd et al disclose that it is also necessary for the correct operation of the fuel cell to heat or cool the gases at various stages in the flow of the two gas streams to and from the fuel cell. It is therefore, necessary to provide a multiplicity of water injection stations in the fuel cell apparatus each of which has different output requirement in terms of volume of water which has to be injected (P. 0003). It further provides an apparatus for supplying the necessary water injection sprays for a fuel cell in a more cost effective, and space and power efficient manner (P. 0005).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the specific liquid supply and injecting means of Herd et al in the fuel cell power system of Grasso et al'259 because Herd et al reveals that in order to

improve the efficiency of the electrochemical reaction, the gas flows are both pressurized and humidified (P. 0002). An additional reason for humidifying the gases is to ensure that the membrane does not dry out since this not only leads to a reduction in the efficiency of the migration hydrogen ions across the membrane, but can damage and reduce the service life of the membrane (P. 0002). (***Emphasis added→***) It is also necessary for the correct operation of the fuel cell to heat or cool the gases at various stages in the flow of the two gas streams to and from the fuel cell. It is therefore, necessary to provide a multiplicity of water injection stations in the fuel cell apparatus each of which has different output requirement in terms of volume of water which has to be injected (P. 0003). It further provides an apparatus for supplying the necessary water injection sprays for a fuel cell in a more cost effective, and space and power efficient manner (P. 0005).

7. Claims 6-7 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Grasso et al 6274259 in view of Grasso et al 6979505 and/or b) Grasso et al 6274259 in view of Herd et al 2003/0116654 as applied to claims 1 and 11 above, and further in view of Dickman et al 6465118.

Grasso et al'259, Grasso et al'505 and Herd et al are applied, argued and incorporated herein for the reasons above.

As to claim 17:

Additionally, Grasso et al disclose a coolant plate means for removing heat from the fuel cell (COL 6, lines 4-15).

However, the preceding reference fails to expressly disclose the specific controlling means/step and the specific temperature threshold.

Regarding claims 6-7, 12-13 and 15-17:

Dickman et al teach a system and method for recovering thermal energy from a fuel processing system comprising a fuel cell stack (TITLE/ABSTRACT). In particular, Dickman et al teach a control system 90 including a controller 92 that directs operation responsive to programmed instruction and/inputs from sensors and user inputs. Controller 92 communicates with a sensor assembly 94 that monitors such variables as the temperature and fluid level in vessel 86. For example, if the temperature of the fluid is hotter than a desired temperature, either additional fluid may be added from a supply or the rate at which the fluid is recycled may be slowed or stopped to allow the fluid to cool; on the other hand, if the temperature of the fluid is lower than desired, the recycle rate may be increased within acceptable limits, some of the stored fluid may be removed (COL 5, line 64 to COL 6, line 15/ COL 7, lines 5-26). Controller 92 may also receive inputs from sensors and controllers including a sensor that measures the rate of operation of the fuel processor or a sensor that measure the rate of operation of the fuel cell stack and adjust such rates (COL 6, lines 17-27).

In reference to claim 14:

Dickman et al disclose heating to temperatures from approximately 50-115 °F (COL 7, lines 28-34). *Given that Dickman et al suggest heating temperatures including the claimed temperature range, it is contended that a suitable temperature threshold falls within the temperature range disclosed by Dickman et al.*

In light of these disclosures, it would have been obvious to those of ordinary skill in the art at the time the invention was made to employ the specific controlling means/step of Dickman et al in the power system of Grasso et al'259, Grasso et al'505 and Herd et al as Dickman et al clearly teach that such specific controlling means/step permits to precisely direct the operation of the system responsive to programmed instructions and/or inputs such that operating variables may be monitored, controlled and adjusted. Accordingly, operation of the power system is greatly improved. Yet further, by using Dickman et al's controlling means/step, the energy requirements of the power system are reduced, and thermal and/or electric loads of the system can be optimized and effectively used within the normal/standard capacity of the power system.

With respect to the specific temperature threshold, it would have been obvious to those of ordinary skill in the art at the time the invention was made to set the temperature threshold of Grasso et al'259, Grasso et al'505 and Herd et al to include any of the temperature values disclosed by Dickman et al's and particularly within the claimed temperature threshold because Dickman et al disclose heating to temperatures from approximately 50-115 °F (COL 7, lines 28-34). Thus, Dickman et al's teachings encompass specific working temperatures for recovering heat and directly teach operation of their power plant within the claimed temperature range. *Still further, it is noted that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed.Cir. 1990).*

8. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Grasso et al 6274259 in view of Grasso et al 6979505 and further in view of Dickman et al 6465118, and/or b) Grasso et al 6274259 in view of Herd et al 2003/0116654 and further in view of Dickman et al 6465118 as applied to claim 6 above, and further in view of Balasubramanian et al 6617065.

Grasso et al'259, Grasso et al'505, Herd et al and Dickman et al are applied, argued and incorporated herein for the reasons above. Nonetheless, the preceding references fail to expressly disclose the specific temperature and humidity sensors.

Balasubramanian et al teach a method and apparatus for maintaining neutral water balance in a fuel cell system (TITLE/ABSTRACT) and such neutral water balance is accomplished via control systems that monitor ambient parameters and fuel cell parameters such as temperature and humidification (COL 4, lines 14-25).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific temperature and humidity sensors of Balasubramanian et al in the fuel cell power plant of Grasso et al'259, Grasso et al'505, Herd et al and Dickman et al as Balasubramanian et al teach that by specifically using temperature and humidity sensors to monitor ambient parameters and fuel cell parameters such as temperature and humidification, neutral water balance is accomplished, thereby fuel cell operation and power output is enhanced.

Response to Arguments

9. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745

RAYMOND ALEJANDRO
PRIMARY EXAMINER